a.) Amendments to Specification

Replace the paragraph beginning at page 1, paragraph [02] , in the specification as originally filed, with the following rewritten paragraph:

--[02] Development of aerial inspection monitor (AIM) systems is critical to the effort to ~~develope~~ develop semiconductor processing techniques in the extreme ultraviolet (EUV). These AIM systems are used for inspection of the masks for the EUV.--

Replace the paragraph beginning at page 1, paragraph [03] , in the specification as originally filed, with the following rewritten paragraph:

--[03] The challenge surrounds the fact that the EUV masks are phase shift masks. As a result, actinic imaging systems are required to find any defects. Magnification and detection of images from the masks ~~is~~ are difficult in these short wavelengths where standard optics do not work.--

Replace the paragraph beginning at page 7, paragraph [53], in the specification as originally filed, with the following rewritten paragraph:

--[53] A brief background on Fresnel zone plates may be helpful. As shown in Fig. 1, a Fresnel zone plate 12 is a diffractive imaging optic, and comprises [[of]] a set of concentric rings 10 with the ring width (zone) decreasing with radii defined by

$$r_n^2 = n\lambda f_Z + an^2\lambda^2, \qquad (1)$$

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Replace the paragraph beginning at page 12, paragraph [74], in the specification as originally filed, with the following rewritten paragraph:

--[74] The focusing efficiency of AFO 16 is equal to the product ~~that~~ of the zone plate lens 12, the refractive lens component 14, and the supporting substrates. Because zone plates have been used mainly for soft x-ray applications until recently and since it is difficult to fabricate phase zone plates for the soft x-ray energy region (~250-1000 eV), it has been widely and erroneously assumed that the zone plate's efficiency is limited to 10%. For x-ray energies greater than 2 keV, the zone plate's focusing efficiency is often dominated by the phase effect and a focusing efficiency close to 30% has been

demonstrated by several groups by suitably shaping the zone profile away from the square wave profile.--

Replace the paragraph beginning at page 25, paragraph [125], in the specification as originally filed, with the following rewritten paragraph:

--[125] The parameters of the zone plate objective12, when used instead of the AFO 16, are designed to have a spatial resolution to meet an AIM 45nm microscope requirement. This zone plate is comparable to the AFO designed for the AIM mode in most performance categories, such as resolution and field of view, and with about twice the throughput. Its focal length is approximately one third of the AFOs designed for the AIM mode and its ~~bandwdith~~ <u>bandwidth</u> is about 0.7%. The resulting short focal length and narrow ~~bandwdith~~ <u>bandwidth</u> is a result of uncorrected chromatic aberration of the zone plate 12, and this zone plate design is a compromise taking into account of the optical designs (*e.g.* the spectral filter) and the mechanical system (*e.g.* objective proximity to the mask, and increased magnification).

Replace the paragraph beginning at page 32, paragraph [142], in the specification as originally filed, with the following rewritten paragraph:

--[142] The AFO lens 16 is not directly compatible with visible light imaging. We plan to integrate the AFO with a visible light objective as shown in Fig. 25 [[o]] <u>so</u> that EUV and visible light can be used simultaneously and will have a common focal plane. In this scheme, a high-NA visible light objective 90 drilled out from the center along its optical axis 92. Specifically holes 102 and 104 are formed in the visible light objective lens 94 and a visible light tube lens 106. Then an AFO 16 is integrated into the front of the objective and is par-focal with the visible-light lens 94. A deflection mirror 96 is placed behind the objective to direct the visible light 90° from the EUV beam path 98. The mirror will have a cutout 100 in the center as well to allow the EUV light to pass through it. The numerical aperture of the AIM AFO 16 is up to 0.0875, and the NA of the visible light lens 94 will be 0.75-0.9, therefore both the illumination and imaging beam paths of the EUV light can fit into a cutout of the visible-light objective.